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PHYSICOCHEMICAL AND MICROBIOLOGICAL PROPRIETIES OF SOME MEAT PRODUCTS IN SHARKIA GOVERNORATE, EGYPT

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ABSTRACT: Meat and meat products differ in their physical and chemical properties depending on the characteristic of meat cuts, the additional material and the method of manufacture. The present investigation was planned to evaluate the physical and chemical quality for some types of local meat products, such as beef burger and luncheon, collected from local markets in Zagazig city, Sharkia Governorate, Egypt. Microbiological and physicochemical proprieties of nine meat products (3 samples of beef burger of Americana, Halwani and Fragello, 3 samples of beef luncheon of Americana, Halwani and Fragello and 3 samples of chicken luncheon of Americana, Halwani and Fragello) were carried out. The obtained results declared that samples of beef burger produced by Fragello contained the lowest parameter of total protein (14.7%), while samples of beef burger produced by Americana showed the highest values (16.90%). Beef and chicken luncheon produced by Fragello contained the highest values of total protein (16.0% and 15.05%) respectively. Also, samples of beef burger and beef, chicken luncheon produced by Fragello contained the highest values of total fat. Regarding the microbiological evaluation, results showed that the lowest content of total bacteria count was observed in different meat products such as luncheon Halwani, coliform group and staphylococci were not detected in all products. Also, beef burger, beef and chicken luncheon samples of Halawani had high values of yellowness (b), and redness (a). However, the microbiological evaluation indicated that Halwani products were the best.

Key wards: Beef luncheon, beef burger, chemical properties, microbiological evaluation.

INTRODUCTION

The modern technology in different fields gives chance for the meat processors to produce new products in different shapes, easily handled, stored and rapidly used .The need for meat products have many tasks includes new flavour, preservation and low calories. The quality of raw material, as well as the additives used in the final products is very important for public health. Therefore, the use of low quality ingredients in the processing yields low quality meat products (**Edris *et al.*, 2012**).

Beef burger as general is containing minced meat with additional ingredients and spices (**Shariati-Ievari, 2013).** Luncheon is emulsion type product containing minced meat forming emulsion with oil and fat by help of salt and filling material (**Leygonie *et al*., 2012**).

The development of a global meat market and the increase of distance between producers and consumers have increased the use of freezing as a preservation technique (**Leygonie *et al.,* 2012).** Meat products are mostly stored in freezing conditions as unpacked and exposed to some quality losses such as oxidative changes and moisture loss causing freezer burn. In fact, muscle foods are under constant oxidizing conditions that resulted in a damage of lipids and proteins (**Min and Ahn, 2005; Estevez, 2011**). The food industry, national and international regulations challenge food scientists as they work to monitor food composition and to ensure the quality and safety of the food supply. The

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characteristics of foods (Microbiology analysis, chemical composition, physical properties and sensory properties) are used to answer specific questions for regulatory purposes and typical quality control (**Nielsen, 2009)**.

Meat products are foods in which meat is the main ingredient, mixed with other components such as fat, water, salt and curing ingredients, spices, *...etc.* (**Cobos and Diaz, 2015**). Meat is liked for its unique taste and it is rich in nutrients, providing best quality of protein, essential fatty acids, essential amino acids and a number of minerals and vitamins particularly the B_{12}. Meat is converted into a number of products all over the world depending upon the consumer likening and desirability (**Malik and Sharma, 2014).** Meat and meat products are an important part of our daily diet and could be considered as excellent sources of essential nutrients (**Mehta *et al*., 2015)**. Meat products initially developed to make palatable products from less desirable cuts of meat. They can be manufactured from meat containing high levels of fat or connective tissue or meat and fat trimmings produced in the preparation of high value and upgrading of medium value cuts (**Tobin *et al*., 2012)**.

The most commonly used meat products are the fresh type, which is stuffed and sold as fresh minced meat. The shelf-life, of this product may be influenced by contamination from various sources during its production, handling and storage. Also, the contamination may lead to spoilage and public health hazard for consumer. To control the spoilage and prolong the shelf-life many preservations are used in the field of meat production. Natural preservatives are sometimes recommended for food preservation. It is known that certain spices have preservative effect, beside their function as a flavour compound (**Turgut *et al.*, 2017**).

The problem at hand was undertaken in an attempt to fulfill the following points:

Evaluation of some chemical, physical and microbiological qualities of some meat products (luncheons and burger) collected from Zagazig markets and study the effect of storage on the physicochemical and microbiological quality of the above products.

MATERIALS AND METHODS

Collection of Samples

A total number of 9 samples from beef luncheon (3 BL 500 g), poultry luncheon (PL 500 g) and beef burger (3BB 500 g) of three companies *i.e.* Americana, Halwany and Fragelo from Zagazig local market Sharkia Governorate, Egypt. Samples just collected were transferred in sterile ice box to koki Americana lab and Robert van ostertag lab during July 2016. Burger samples stored at -10°C to -15°C, while luncheon sample, were stored at 2-4°C for 3 months.

Chemical Analyses

Moisture, crude protein, ether extract and ash contents were determined according to **AOAC (2005)**. Total carbohydrates were calculated by difference. Three replication of all these determination were carried out.

Colour Evaluation

Colour of beef burger samples was measured using a Hunter colour Lab Model D25 and colour differences meter. Colour was expressed in terms of lightness (L-value), redness (a-value) and yellowness (b- value). Standardization was done by calibrating the machine with a pink standard plate (L= + 70.9, a= +22.4 and b= +8.2). Hunter values were average of three readings from the same location.

Microbiological Examination

Preparation of samples for microbiological examination

For preparation of food homogenate; containing 10 g of meat product was transferred to a sterile polyethylene bag 90 ml of sterile Ringer solution (OXOID) under aseptic conditions. The contents of the bag were then stomached for 60 seconds using stomacher (Stomacher lab. Blender 400, Seward lab – Serial No. 30 469 Type Ba7021 London) to have a dilution of 1/10. One ml from the original suspension was transferred with a sterile pipette to another tube containing 9 ml of sterile Ringer solution and mixed well using test tube shaker to make next dilution 10^2 from which further 10 folds decimal serial dilutions were prepared up to dilution of 10^7.Ten grams of each sample

were homogenized with 90 ml of sterile saline solution (9 g NaCl/L distilled water). The suspension was shocked by shaker for 5 minutes to give 0.1 dilutions. Then different dilutions (1: 10^1 to 1: 10^6) were prepared to be used for microbiological examination.

Aerobic plate count (APC)

The aerobic plate count (APC) was performed as described in **(APHA, 1992).**

Moulds and yeasts

Potato Dextrose Agar was used for yeast and mould enumeration. Plates were incubated at 25°C for 5 days, according to **(APHA, 1992)**.

Total coliform bacterial count

Violet Red Bile Agar was used for the enumeration of coliforms. Plates were incubated at 37°C for 24 hr., according to **(APHA, 1992)**.

Staphylococcus aureus

Staphylococcus aureus test was performed as described in **ISO (4833-1 (2013)**.

***Salmonella* spp.**

Salmonella spp. test was performed as described in **ISO (6579 (2002).**

Statistical Analysis

Data of the present study was subjected to analyses of variance (ANOVA) using software **(SAS, 1990)**. Differences between means were compared by the least significant differences (LSD) at $P < 0.05$. All measurements were carried out in triplicate.

RESULTS AND DISCUSSIONS

Local Meat Products Market Survey

Burger samples

Microbiology examination of burger samples

Burgers are frequently eaten products, mainly due to the current increase in the number of fast foods and because they are easy and fast to prepare (**Rodriguez-Carpena *et al.*, 2012**). The microbiological quality of meat products is depending on a number of factors such as row materials and sanitation during process (**El-Desouky, 2009**).

The three samples of burger were examined to determine the microbiological quality. The obtained results are shown in Table 1, which indicate that the aerobic plate count (APC) ranged from $2x10^4$ to $10x10^4$ cfu/g. However all APC count of samples were under the **Egyptian Standards (2005)**. These results are in agreement with those obtained by **El-Desouky (2009) and Saleh (2010)**.

The fecal coliform bacteria count revealed that all burger samples were not exceed 3 cfu/g. These results are in agreement with those obtained by **Egyptian Standard (2005**) and **El-Desouky (2009)** which they reported that the coliform bacteria count should not be exceeded of 105 cfu/g.

Esherichia coli was not detected in any of the nine burger samples. These results are in agreement with those obtained by **FSAI (2013)**. *Staphylococcus aureus* in all burger samples was not exceed 10^2 cfu/g. These results are in agreement with those recorded by **Egyptian Standard (2005).** Salmonella of all burger samples were not detected. These results are in agreement with those recorded by **Egyptian Standards (2005) and Saleh (2010).**

Chemical composition of beef burger samples

The nine samples of beef burger were chemically analyzed to determine the main chemical composition. The obtained results are shown in Table 2. It could be noticed that the moisture content ranged from 58.01 to 62.00%. These results are in agreement with those obtained by **Egyptian Standard (2005) El-Desouky (2009), Saleh (2010) and Heydari *et al*. (2015).**

The crude protein content of beef burger samples ranged from 14.7 to 16.7 %. These results are in agreement with those obtained by **Egyptian Standard (2005), Small (2007) El-Desouky (2009) and Saleh (2010).** With regard to fat content of beef burger samples, it could be observed that the fat content ranged from 8.6 to 9.8%. These results are in agreement with those reported by **Egyptian Standard (2005), Saleh (2010) and Selani *et al*. (2015)**.

On the other hand, total ash contents of beef, burger samples were ranged from 3.60 to 4.59%. These results are in agreement with those obtained by **El-Desouky (2009), Saleh (2010) and Heydari *et al.* (2015)**. The differences between results may be due to different sorces of materials and processing conditions.

Table 1. Microbiological examination of burger samples (cfu/g)

Beef burger sample	Aerobic plate count	Coliform group	*Esherichia coli*	*Staphylococcus aureus*	Salmonella (cfu/25 g)
AD1	2×10^4	0.47×10^1	ND	$<10^2$	ND
AD2	5×10^4	0.56×10^1	ND	$<10^2$	ND
AD3	8×10^4	0.61×10^1	ND	$<10^2$	ND
HD1	$4x10^4$	0.23×10^1	ND	$<10^2$	ND
HD2	6×10^4	0.33×10^1	ND	$<10^2$	ND
HD3	8×10^4	0.40×10^1	ND	$<10^2$	ND
FD1	6×10^4	0.42×10^1	ND	$<10^2$	ND
FD2	8×10^4	0.58×10^1	ND	$<10^2$	ND
FD3	10×10^4	0.67×10^1	ND	$<10^2$	ND

*ND: Not detected
AD1: Americana products day one, AD2: Americana Products day two, AD3: Americana Products day three
HD1: Halawani day one, HD2: Halawani day two, HD3: Halawani day three
FD1: Fragello day one, FD2: Fragello day two, FD3: Fragello day three

Table 2. Chemical composition of beef burger samples

Beef burger	Component (g/100 g)				
	Moisture	**Crude protein**	**Ether extract**	**Ash**	**Total carbohydrate**
AD1	58.01^{c}	16.7^{a}	9.20^{c}	3.59^{b}	12.50^{b}
AD2	58.01^{c}	16.2^{ab}	8.90^{cd}	4.59^{a}	12.30^{b}
AD3	60.01^{b}	16.1^{ab}	8.20^{e}	4.19^{ab}	11.50^{c}
HD1	59.81^{bc}	15.8^{b}	9.80^{a}	3.19^{c}	11.40^{c}
HD2	59.80^{bc}	15.1^{c}	9.60^{b}	4.40^{a}	11.10^{cd}
HD3	62.00^{a}	14.8^{d}	8.60^{d}	4.00^{ab}	10.30^{d}
FD1	59.50^{bc}	15.1^{c}	8.90^{cd}	3.10^{c}	13.40^{a}
FD2	59.50^{bc}	15.1^{c}	8.73^{d}	3.60^{b}	13.07^{ab}
FD3	60.00^{b}	14.7^{d}	8.00^{f}	3.65^{b}	12.15^{bc}

The same letter in the same column are not significantly different at $p\leq0.05$.
AD1: Americana products day one, AD2: Americana Products day two, AD3: Americana Products day three
HD1: Halawani day one, HD2: Halawani day two, HD3: Halawani day three
FD1: Fragello day one, FD2: Fragello day two, FD3: Fragello day three

Finally the total carbohydrates ranged from 10.3 to 13.40%. The total carbohydrates content could be from non-meat ingredients like starch, ground bread, onion ... *etc.* These results are in agreement with those recorded by **Egyptian Standard (2005), El-Desouky (2009) and Saleh (2010).**

Colour characteristic of beef burger samples

Meat and meat products colour are an important quality attribute and one of the main factors determining the acceptability of the consumer, which can be influenced by the concentration and chemical state of myoglobin, by the physical characteristics of the meat and by the presence of non-meat ingredients (**Selani *et al*., 2015**).

Table 3 shows that beef burger samples of Amricana had high values of lightness (L), while beef burger samples of Halawani had high values of yellowness (b), and redness (a).

Microbiological examination of Beef luncheon samples

The nine samples of beef luncheon were examined to determine the microbiological quality during storage at +4°C for 3 months. The obtained results are shown in Table 4 which indicate that the aerobic plate count (APC) ranged from 4×10^3 to 1×10^4 cfu/g. These results are in agreement with those obtained by **Daglioglu *et al.* (2005)**.

The coliform group count revealed that all beef luncheon samples are not more 3 cfu/g. These results are in agreement with those obtained by **Daglioglu *et al*. (2005).**

The *Esherichia coli* not detected in any of beef luncheon samples. These results agree with **Hassanin *et al*. (2014)**.

Staphylococcus aureus of beef luncheon samples was not detected in all samples. These results are in agreement with those obtained by **Daglioglu *et al.* (2005)**.

Salmonella of the all-beef luncheon samples revealed that there is no positive samples are detected. These results are in agreement with those obtained by **Bhilegaonkar (2009) and Hassanin *et al.* (2014).**

Chemical composition of beef luncheon samples

The nine samples of beef luncheon were chemically analyzed to determine the main chemical composition. The obtained results are shown in Table 5. It could be noticed that the moisture contents ranged from 65.61 to 68.29%. These results are in agreement with those obtained by **Edris *et al*. (2012).** The crude protein content of beef luncheon samples were ranged from 15.1 to 16.8%. These results are in agreement with those obtained by **Al-Kutby (2012)**. With regard to fat content of the beef luncheon samples, it could be observed that the fat content ranged from 7.6 to 8.9%. These results are in agreement with those recorded by **Egyptian Standard (2005)**. Ash content of beef luncheon samples ranged from 3 to 5.49%. These results are in agreement with those obtained by **Al-Kutby (2012)**.

Finally the highest significantly values of total carbohydrate was in sample (AD1) which contained 6.4%, while the lowest significant value was in sample (HD3), which contained 4.9%. The total carbohydrates content could be came from non-meat ingredients like starch, ground bread, onion ...*etc.* which they allowable by **Egyptian Standard (2005**).

Colour measurements of beef luncheon samples

Table 6 shows that beef luncheon samples of Halawani (46.06) had high values of lightness (L) and yellowness (b12.12), while beef luncheon samples of Fragello had high values of redness (21.46).

Chicken luncheon

Microbiology examination of chicken luncheon samples

All samples of chicken luncheon were examined to determine their microbiological quality. The obtained results are shown in Table 7 which indicate that the aerobic plate count (APC) ranged from 2×10^3 to 9×10^3 cfu/g. These results are in agreement with those obtained by **Abdallah *et al.* (2013)**. Coliform bacteria count revealed that all chicken luncheon samples were not more than 3 cfu/g. These results are in agreement with those obtained by **Stagnitta *et al*. (2006)**. *Esherichia coli* is not detected. These results are in agreement with those obtained by **Stagnitta *et al.* (2006) and FSAI (2013)**.

Staphylococcus aureus was not detected in all samples of the chicken luncheon. These results are in agreement with those obtained by **Abdallah *et al*. (2013)**. Salmonella was not detected in all nine chicken luncheon samples. These results are in agreement with those obtained by **(FSAI, 2013)**.

Table 3. Colour measurements of beef burger samples

Beef burger	Colour measurements		
	L	B	A
AD1	50.88^{d}	10.83^{d}	9.4^{d}
AD2	51.04^{c}	11.08^{c}	10.15^{c}
AD3	51.11^{c}	11.25^{c}	10.28^{bc}
HD1	48.19^{f}	12.12^{a}	10.56^{a}
HD2	49.76^{e}	11.91^{ab}	10.48^{ab}
HD3	51.76^{b}	11.68^{b}	10.46^{ab}
FD1	47.37g	11.65^{b}	10.32^{b}
FD2	51.22^{bc}	11.56^{b}	10.27^{bc}
FD3	52.05^{a}	11.51^{bc}	10.19^{c}

L : Lightness B : Yellowness A : Redness

Table 4. Microbiological examination of beef luncheon samples

Beef burger	Aerobic plate count (cfu/g)	Coliform group (cfu/g)	*Echerichia coli* (cfu/g)	*Staphylococcus Aureus* (cfu/g)	Salmonella (cfu/25 g)
AD1	6×10^{3}	<3	ND	$<10^{2}$	ND
AD2	7×10^{3}	<3	ND	$<10^{2}$	ND
AD3	8×10^{3}	<3	ND	$<10^{2}$	ND
HD1	4×10^{3}	<3	ND	$<10^{2}$	ND
HD2	5×10^{3}	<3	ND	$<10^{2}$	ND
HD3	6×10^{3}	<3	ND	$<10^{2}$	ND
FD1	7×10^{3}	<3	ND	$<10^{2}$	ND
FD2	8×10^{3}	<3	ND	$<10^{2}$	ND
FD3	10×10^{3}	<3	ND	$<10^{2}$	ND

*ND: Not detected

Table 5. Chemical composition of beef luncheon samples (g/100g wet weight basis)

Beef burger	Component				
	Moisture (%)	Crude protein (%)	Ether extract (%)	Ash (%)	Total carbohydrate (%)
AD1	65.61^{d}	16.1^{b}	8.20^{b}	3.69^{c}	6.4^{a}
AD2	65.61^{d}	15.8^{bc}	8.10^{b}	4.90^{b}	6.4^{a}
AD3	65.61^{d}	15.6^{c}	7.80^{d}	5.49^{a}	5.8^{b}
HD1	67.29^{b}	15.9^{bc}	8.01^{c}	3.00^{d}	5.8^{b}
HD2	67.19^{b}	15.5^{c}	8.01^{c}	3.16^{d}	5.6^{b}
HD3	68.29^{a}	15.1^{d}	7.60^{d}	4.56^{bc}	4.9^{c}
FD1	65.41^{d}	16.8^{a}	8.90^{a}	3.09^{d}	5.8^{b}
FD2	65.40^{d}	16.6^{a}	8.70^{a}	3.50^{c}	5.8^{b}
FD3	66.50^{c}	16.1^{b}	8.20^{b}	3.60^{c}	5.6^{b}

The same letter in the same column are not significantly different at $p\leq0.05$.

Table 6. Colour measurements of beef luncheon samples

Beef burger	Colour measurements		
	L	A	B
AD1	36.84^{d}	6.99^{d}	20.51^{b}
AD2	35.62^{d}	6.97^{d}	20.65^{b}
AD3	32.50^{d}	7.21^{c}	20.87^{b}
HD1	46.06^{a}	11.36^{b}	10.19^{c}
HD2	44.06^{a}	11.51^{b}	10.83^{c}
HD3	43.59^{b}	12.12^{a}	10.93^{c}
FD1	42.85^{c}	6.98^{d}	21.47^{a}
FD2	42.66^{c}	7.35^{c}	21.39^{a}
FD3	42.28^{c}	7.38^{c}	21.35^{a}

L : Lightness B : Yellowness A : Redness

Table 7. Microbiological examination of chicken Luncheon samples

Samples	Aerobic plate count (cfu/g)	Coliform group (cfu/g)	*Echerichia coli* (cfu/g)	*Staphylococcus aureus* (cfu/g)	Salmonella (cfu/25 g)
AD1	2×10^{3}	<3	ND	$<10^{2}$	ND
AD2	4×10^{3}	<3	ND	$<10^{2}$	ND
AD3	6×10^{3}	<3	ND	$<10^{2}$	ND
HD1	3×10^{3}	<3	ND	$<10^{2}$	ND
HD2	5×10^{3}	<3	ND	$<10^{2}$	ND
HD3	7×10^{3}	<3	ND	$<10^{2}$	ND
FD1	5×10^{3}	<3	ND	$<10^{2}$	ND
FD2	7×10^{3}	<3	ND	$<10^{2}$	ND
FD3	9×10^{3}	<3	ND	$<10^{2}$	ND

*ND: Not detected

Chemical composition of chicken luncheon samples

All of chicken luncheon samples were chemically analyzed to determine the main chemical composition. The obtained results are shown in Table 8. It could be noticed that the moisture content ranged from 68.96 to 73.81%. These results are in agreement with those obtained by **Chakanya *et al.* (2017), Garcia-Lomillo *et al*. (2017) and Turgut *et al.* (2017)**.

The crude protein content of chicken luncheon samples ranged from 13.9 to 15.05%. These results are in agreement with those obtained by **Chakanya *et al*. (2017), Garcia-Lomillo *et al*. (2017) and Turgut *et al*. (2017).** With regard to fat content of the chicken luncheon samples, it could be observed that the fat content ranged from 1.74 to 1.9%. These results are in agreement with reported by **Egyptian Standard (2005), Ohman *et al.* (2015) and Garcia-Lomillo *et al.* (2017)**.

On the other hand the ash content of chicken luncheon samples ranged from 3.17 to 4.25%. These results are in agreement with those obtained by **Al-Obaidi (2011), McHenry (2013), Chakanya *et al.* (2017) and Garcia-Lomillo *et al.* (2017).**

Finally, it could be else seen from Table 8 that the highest value of total carbohydrates was in sample (AD1) which contained 10.8%, while the lowest value was in sample (HD3), which contained 4.7%. These results are in agreement with those obtained by **Al-Obaidi (2011)**.

Colour measurements of chicken luncheon samples

Table 9 show that chicken luncheon samples of Halawani had high values of lightness (L) and redness, while chicken luncheon samples of Fragello had high values of yellowness (b) and redness (a).

Table 8. Chemical composition of chicken luncheon (g/100g on wet weight basis)

Chicken luncheon	Component				
	Moisture (%)	Crude protein (%)	Ether extract (%)	Ash (%)	Total carbohydrate (%)
AD1	68.96^{e}	14.80^{b}	1.89^{a}	3.55^{c}	10.8^{a}
AD2	68.96^{e}	14.40^{c}	1.85^{b}	4.19^{a}	10.6^{a}
AD3	69.96^{d}	14.20^{c}	1.79^{c}	4.25^{a}	9.8^{b}
HD1	71.82^{b}	14.70^{b}	1.89^{a}	3.09^{d}	8.5^{c}
HD2	71.81^{b}	14.50^{c}	1.74^{c}	3.75^{b}	8.2^{c}
HD3	73.81^{a}	13.90^{d}	1.40^{d}	3.75^{b}	4.7^{d}
FD1	70.73^{c}	15.05^{a}	1.90^{a}	3.17^{d}	9.5^{b}
FD2	70.35^{c}	14.90^{b}	1.70^{c}	3.55^{c}	9.5^{b}
FD3	71.00^{b}	14.06^{c}	1.90^{a}	3.74^{b}	9.3^{b}

The same letter in the same column are not significantly different at $p \leq 0.05$.

Table 9. Colour measurements of chicken luncheon samples

Chicken luncheon	Colour measurements		
	Red	Yellow	White
AD1	11.52^{cd}	6.50^{b}	57.22^{bc}
AD2	11.65^{cd}	6.65^{b}	57.48^{bc}
AD3	11.93^{c}	6.72^{b}	57.88^{b}
HD1	12.60^{b}	3.08^{c}	60.78^{a}
HD2	12.82^{b}	3.18^{c}	60.50^{a}
HD3	13.67^{a}	3.36^{c}	60.43^{a}
FD1	11.36^{d}	7.71^{a}	54.18^{e}
FD2	11.42^{d}	7.16^{a}	55.44^{d}
FD3	11.53^{cd}	6.85^{b}	56.86^{c}

The same letter in the same column are not significantly different at $p \leq 0.05$.

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الخواص الفيزوكيميائية والميكروبيولوجية لبعض منتجات اللحوم فى محافظة الشرقية

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اللحوم ومنتجات اللحوم تختلف في خصائصها الفيزيائية والكيميائية تبعا لخصائص اللحوم و المواد المضافة وطريقة التصنيع وتتمثل خطة البحث فى تقييم الجودة الفيزيائية والكيميائية والميكروبيولوجية لبعض أنواع منتجات اللحوم المحلية، مثل برجر ولانشون اللحم البقري، التي تم جمعها من الأسواق المحلية لمدينة الزقازيق بمحافظة الشرقية، حيث تم دراسة تقييم الخواص الميكروبيولوجية والكيميائية لتسع منتجات من اللحوم (٣ عينات من برجر اللحم البقري من إنتاج شركات أمريكانا، حلواني وفراجيلو، ٣ عينات من لانشون اللحم البقرى من إنتاج شركات أمريكانا، حلواني وفراجيلو و ٣ عينات من لانشون الدجاج من أنتاج شركات أمريكانا، حلواني، وفراجيلو)، وخزنت على درجة حرارة [(لانشون خزن على درجة حرارة +٢ : +٤°م) (البرجر خزن على درجة حرارة -٥ : -١٠°م)] وتم تحليل تلك العينات من حيث التحليل الميكروبيولوجي والكيميائي وخواص اللون، وأوضحت النتائج أن عينات اللانشون وبرجراللحم البقرى الناتج من شركة فراجيللوسجلت أقل محتوى من البروتين الكلي (١٤,٧%)، في حين أظهرت عينات اللانشون وبرجراللحم البقرى التي تنتجه شركة أمريكانا أعلى القيم (١٦,٩٠%)، ولكن عينات لانشون اللحم البقرى والدجاج لشركة فراجيللو سجلت أعلى قيم من حيث محتوى البروتين (١٦ و ١٥,٠٥% على التوالى)، كذلك سجلت كل منتجات فراجيللو أعلى محتوى لقيم نسبة الدهن عن باقى المنتجات المنتجة من شركات أمريكانا وحلوانى، فيما يتعلق بالتقييم الميكروبيولوجي، أظهرت النتائج أن أقل محتوى من عدد البكتيريا الكلية، لوحظت في كل منتجات اللحوم المنتجة من شركة حلوانى وخصوصا اللانشون كما أن كل المنتجات خلت من مجموعة القولون والمكورات العنقودية كما أعطت كل منتجات حلوانى أفضل القيم الخاصة باللون عن منتجات امريكانا وفراجيللو أشارة إلى أن منتجات حلواني كانت أفضل المنتجات من حيث الخواص البكتريولوجية وخواص اللون.

الكلمات الإسترشادية: منتجات اللحوم، اللانشون البرجر، القيمة الغذائية، الخصائص الميكروبيولوجية، الخواص الطبيعية.